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1/6/2006
nue summary

Summary of session.

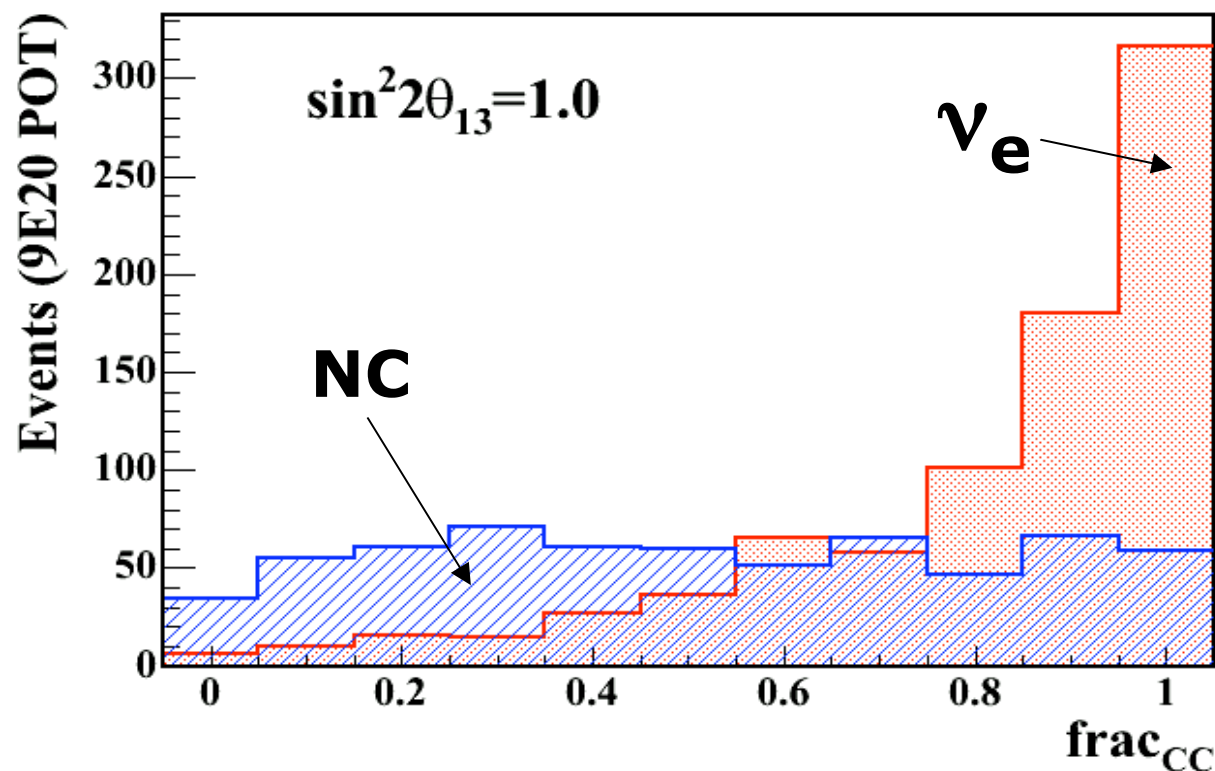
- R. Gran: test of scanning rules.
- M.Thomson: a new method for electron selection, the “ultimate”
- Caius Howcroft: maximum use of data by removing muons from data-CC events.
- Alex Sousa: Finishing MDC documentation (Previous talk).

Scanning

- Do we want to perform a eye-scan based analysis ? Answer: don't know yet, but will try.
- Tufts group has developed carefully worked out scan-rules (on DOCDB).
- Richard Gran used these rules at an independent institution for first time and will fine-tune them.
- This looks doable, but will be time-consuming because of book-keeping during production eyescanning.

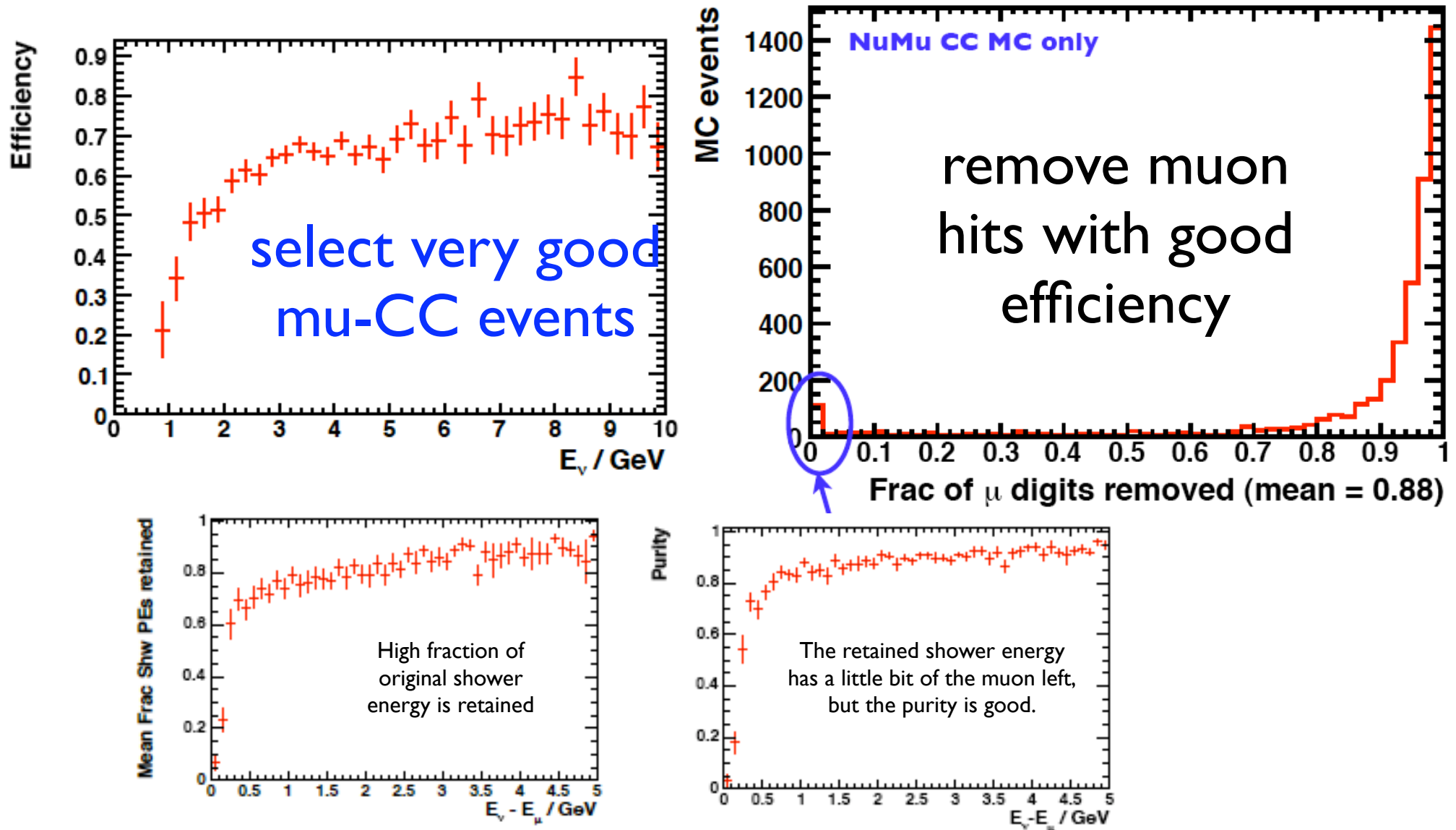
The Ultimate by M.T.

- ★ Adopt Nearest Neighbour approach
- ★ Compare each event to “libraries” of MC events (ν_e and NC)
- ★ Select **N** best matches
- ★ Fraction of N best matches which are ν_e gives a measure of the likelihood of the event being a ν_e



First test of method with “low” statistics MC.

Caius' new tool



Idea: get a calculation of the NC background to nue signal from FAR data itself.

Goal

- Produce preliminary notes by June 2006.
- Final result by sep 2006.
- Likely result: $1 \text{ e}20$ protons
 - expected numu events:
 $\sim 394(293, < 10 \text{ GeV})$. disap: ~ 100 evts.
 - expected nue events: ~ 2 signal/3.4 back
(with known efficiencies)
 - for $\sin^2 2\theta_{13} = 0.12$, 0.0025 eV^2

Things to do

- Decide on types of analysis
 - proposal: 3 analysis
 - computer based with current methods
 - computer based with alternate methods
 - eyescan based.
 - try to get one done by June.

Tools

- Nue ANA event classification and cuts software - DONE
- Scanning - getting setup. Production scanning(Dan + Tony)
- Overlay MC on ND data ?
- system for eyescan efficiency measurement(bubble chamber people)
- CC handling. Production of muon removed events/ electron added events. (Caius)

Need to shift discussion to background calculations

The classic small statistics background analysis

- Settle on data sample. Perform all hardware checks possible.
- Have MC ready for (mostly efficiency measurement).
- Make crude cuts on data sample to divide up the data for studies on backgrounds. Also have a distilled sample that should have signal.
- perform estimates of individual background components. develop cuts or methods for individual backg.
- put all cuts (or methods) together. Spot inconsistencies.
- Iterate to get background estimates and signal efficiency.

nue background study

The NUE analysis is mostly about estimating the backgrounds properly in the far detector. MD proposes that they be split up in the following way. For each of the following backgrounds the person(s) responsible should isolate the sample in the near detector and demonstrate the extrapolation technique to the far detector.

One may not be able to disentangle the near detector spectra for each background. Nevertheless, the background source and extrapolation technique are different and therefore it makes sense to have different people think about them.

An additional advantage is that everyone working on these backgrounds must start with the same set of events and the same cuts to get to the interesting samples. This allows independent checks on the analysis from different perspectives.

background studies

- Beam contamination NUE
- charged current background
- ν_τ background
- cosmic backg.
- neutral current backg.
 - single pion: neutral and charged
 - multipion

Discussion in progress in the group on how to divide up this effort.

An important task that should not be neglected is the normalization using the muon data. Essentially the NUe group also need to perform the disappearance analysis for self-consistency. It need not be as refined as the CC-group's analysis. The reason it need not be as refined is because we expect very few electron type events, and we need the muons just to set the scale of sensitivity and Δm^2 .

Second important task is the EM shower energy calibration in FD versus ND. A couple of new ideas exist, e.g. use of Brems spectra in ND and FD.

